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ABSTRACT

A theory of adult cognitive development which includes two post-formal operational stages is described. The paper is divided into three sections. The first section provides background for discussion of the theory. A case study in which various employees in a hypothetical organization react to a problem is provided. Examples of pre-logical, logical, post-logical, and unitary thought are demonstrated and illustrated with charts. In a second section, an analysis of critical thinking is provided. According to this analysis, three balances must be maintained in the training of critical thinking: the balance between sufficient research and realizing when to act; the balance between trust in hunches and unbiased use of evidence; and the balance between abstract and concrete thought. The importance of cognitive development is discussed in the final section. Notes and a bibliography conclude the paper. (LP)

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POST-LOGICAL THINKING

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INTRODUCTION

The past five years have witnessed an accelerated awareness that college students and other adults cannot or do not think rigorously. There has also been an accelerated concern to improve adult thinking skills and habits. Many of the programs initiated out of these concerns are designed to foster logical thinking. In Piagetian terminology, they are designed to bring adults into the formal operations stage.[1]

I am heartened to see the development of these programs because I share the awareness that adults do not, in general, think logically and, for reasons which I will explain below, I too am concerned about it. However, I do not believe that logical critical thinking is the highest form of thought, nor that formal operations is the final stage of adult cognitive development. In this paper, I will describe a theory of adult cognitive development which includes two post-formal operational stages. I have three reasons for doing so:

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First, I have found this to be a useful theory. Knowing an adult's level of cognitive development helps me to determine how to inform that person, what level of analysis he or she is capable of working at, and whether it is appropriate for me to intervene by working to raise the individual's cognitive level.

Second, the theory provides a context in which to examine critical thinking and programs designed to foster it. The theory provides a perspective on where and and how it is appropriate to teach critical thinking, and what its limits are.

Third, and most important, the theory is inspiring. In the context of this theory, logic is not seen as an abstract standard against which thinking can be measured. Rather, logical thinking is seen as being characteristic of one stage in human development which can go much further. Focussing on human development tends to lift us out of the dispassionate stance that scientists tend to live in. While it is important for us to be dispassionate (in the sense of unbiased) in examining the results of our research, it is also important for us to be passionate (that is, enthusiastic and committed to action) about thinking and improving thinking. Throughout this paper I will be exploring the importance of striving toward our potential, and will also explore the role of cognitive development within human development. I will also return to this point at the end of the paper.

BACKGROUND FOR DISCUSSION OF THE THEORY

I am most concerned here with explaining the theory and showing how it manifests itself in daily work life rather than in presenting evidence of the theory's viability. (Readers interested in such evidence are referred to Koplowitz 1978 & 1984.) One major example, concerned with a troubled organization, will be used throughout and will be used to demonstrate thinking characteristic of each stage. I will describe the organization and then explain how employees at different levels of cognitive development would analyze the problem. The characteristics of thinking at all stages are summarized in Table 1.

The organization we are concerned with gets its funding from the government. Within the organization is a department which provides consulting services to organizations in both the public and private sectors.

> Mike has just taken over as head of the department and is assessing the situation he has inherited. He has a reputation as a good listener. Before he took the job, Mike spoke with his new supervisor, Betty. She feels it is time for the department to become more visible and to find ways of serving more clients. She believes that the department is doing some creative work, but she indicated that she has never clearly understood what the department has been doing. The official reports are all filed on time, but management still does not have a feel for the department's activities and achievements. Mike also spoke with the three consultants working for him, Ed, Chris and Wilma. They told him that the department's greatest problem is low morale. Ed and Wilma feel overworked and underappreciated. Ed senses that middle and upper management are not happy with the department's work, but he cannot point a finger at hard evidence to substantiate the feeling, and he has never confronted Mike's predecessor or Betty to find out what, if anything, is wrong.

As I explore this organization and the thinking of its employees, you might reflect on similar individuals and organizations that you are familiar with to see how they fit the patterns I present.

PRE-LOGICAL THOUGHT

Ed is generally a pre-logical thinker[2]. In exploring the cause of problems, he tends to make one-step analyses.

> When asked why managers give no feedback about the department's work, Ed says that middle management does not know what the staff has been doing. Unless probed, however, he will not explore why middle management does not understand the department. He does not look at the

> pressures on middle management that might keep its attention away from the department's work and he does not explore how the department might act differently so as to get feedback from management.

For a pre-logical thinker like Ed, any state of affairs is conceived of as the consequence of the state immediately preceding it, and the analysis ends there.

The absence of logical reasoning in the pre-logical thinker appears in several ways. Pre-logical thinkers tend to respond emotionally to statements rather than to analyze them logically.

> Mike told Ed that he thought that the department had not organized its work efficiently, and that it was therefore important for the department to explore how it carried out its work. Ed replied "You're wrong. We've been working as hard as we can."

Note the syllogism imbedded in Mike's statement.

Major Premise: We should examine inefficient aspects of the department.

Minor Premise: The organization of our work is inefficient.

Conclusion: We should examine how we organize our work.

Logically, Ed can disagree with the conclusion only by disagreeing with one or both of the premises. Ed, however takes the statement personally, understanding it only as an attack on himself and his work. Mike never accused the department of not working hard. In defending himself, Ed acts emotionally and, typical of pre-logical thinkers, changes the subject instead of dealing with it rationally.

Pre-logical thinkers tend not to relate effects of one variable to those of another.

> Ed suggested the department take a consulting skills course. He mentioned another department in the organization that had taken the course and which was outperforming their department, citing that as proof of the value of the training. "That doesn't prove anything," Wilma said. "Ed, you know that their morale is so much better than ours that they're bound to outperform us".

Ed lacks the strategy that Inhelder and Piaget (1958) called "separation of variables". He focusses on only one variable at a time, in this case, skill level. He does not relate this variable to other variables, such as morale, which also affect the outcome.

Wilma thought that the arrival of a new manager, especially one who is a good listener, might be a good time for department members to meet to discuss the department's problems. When Wilma convened the meeting, Ed showed another limit to pre-logical thinking, the inability to separate form or method from content.

> Wilma opened by saying, "Let's start off by getting clear about just what the problems are". Ed's response was, "Well, I think someone needs to tell management to get off our backs.".

Pre-logical thinkers like Ed have difficulty setting agendas and sometimes abiding by them. They have trouble separating talk about how they will work on a problem from the problem solving itself.

Ed has also shown two other characteristics of pre-logical thinkers. They tend to locate blame for problems in others, and they tend to believe that it is these others who must be changed if problems are to be solved. It is clear to Ed that management is to blame for the morale problem, and that the solution to the problem lies in management's changing its ways.

Pre-logical thinkers tend not to think abstractly, and the boundaries they draw around parts of the world they know tend to be solid, closed boundaries. It is clear to Ed who is a manager and who is not, and it is clear to him that problems in management can be solved only by helping or forcing managers to change. And when Ed talks about the management of the organization, he means the people at Mike's level and above (and is likely to use the singular noun "management" as plural as in "We must give management what they want"). Management is not an abstract function within the organization, but a collection of concrete individuals. In Ed's view, the boundary around this collection is closed; any individual in the organization is either inside the boundary or outside of it.

The poor quality of Ed's thinking puts him at a disadvantage in the world, and also disadvantages groups of which he is a member. Because he does not analyze logically, he is open to manipulation by others. Because his causal analyses are one-step and because he does not separate method from content, he is limited in his abilities to understand situations he is in and devise solutions for his problems. He responds illogically, and often defensively to criticism and cannot follow agendas, and so is a distraction to groups he works with. His tendency to react emotionally and to not analyze arguments logically leaves him ill-suited to make reasonable choices. He will detract from any democracy, whether on a national or a work-place scale.[3]

It is not just every human's democratic right to be intelligent, to use Machado's (1980) phrase, but also every democracy's need to develop the intelligence of its members.

LOGICAL THINKING

Both Wilma and Chris are logical thinkers. In exploring the cause of problems, they look for linear causal chains.

> Wilma agrees with Ed that the management's lack of feedback about the department's work is due to its lack of knowledge about the department. She has looked further to see that department members do keep a low profile which leaves management without knowledge of the department. She understands that this is why management does not give feedback (Figure 1a). Wilma also tried to understand the department's morale problem. It occurred to her that the staff members are not sure of the value of their work. Further thought showed her that staff members had no measure of the value of their work. This led to their uncertainty, which caused the morale problem (Figure 1b).

Wilma's analysis does not stop at the situation immediately preceding the one to be explained, but rather is carried out to the construction of a causal chain (Figure 1) which could, theoretically, be extended back indefinitely.

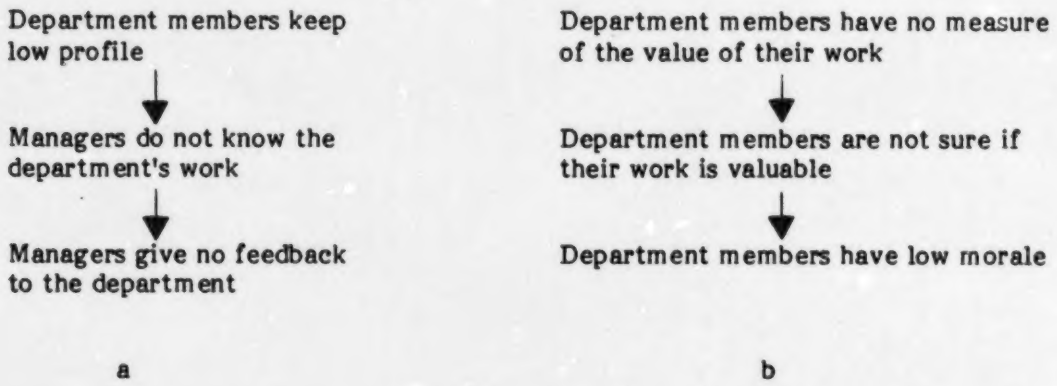
Department members keep low profile
Managers do not know the department's work
Managers give no feedback to the department
a
Department members have no measure of the value of their work
Department members are not sure if their work is valuable
Department members have low morale
b

FIGURE 1: Logical linear concept of causality

Logic plays an important role in Wilma's and Chris's thinking.

> Chris did not agree with Mike when he said that the department should examine how it organized its work because work was being done inefficiently. She thought for a moment about why she disagreed. It was clear to her that the department's work could be better organized, but she realized that there was no consensus about which work should be done, and that the focus of discussion should be on strategic planning. She told Mike that she disagreed with him because she felt it was not important at the moment to examine inefficiencies in the department. It was more important to develop consensus around departmental goals.

Chris was able to separate out from Mike's syllogism exactly which premise it was that she disagreed with. This is a critical ability of logical thinking.

As was shown before, Wilma, as a logical thinker, was able to relate the effect of department members' skills, as one variable, to the effect of their morale, as another variable. She sees them operating independently to affect the department's performance.

When the meeting began, another ability of logical thinkers appeared.

> Wilma suggested that the group begin its meeting by clarifying what the department's problems were, and then proceed with discussion of each problem separately. After Ed jumped in and said that he felt what was needed was to get someone to tell management to get off the group's backs, Chris said she was not happy with Wilma's proposed agenda. She suggested that the meeting begin not as Wilma proposed but with a discussion of how each of the group members felt about working in the department.

Ed, as a pre-logical thinker, was unable to separate the content of the meeting from the process by which the content would be addressed. He began talking about the problems before it was settled how those problems would be discussed. Chris, as a logical thinker, knew that the topic was the agenda, and she adressed that topic. She was able to separate content from process.

When the meeting progressed to a discussion of problems and their solutions, two other characteristics of logical thought were manifested.

> The group members felt that some of the department's work was not of a high enough quality, and that this was because they themselves were unskilled at organization development. However some of their work entailed developing organizations. They decided that they should get training in this area. They also felt that they were not getting the clear feedback they needed from management, and that this was because managers were uncomfortable and unskilled at giving feedback. They decided that managers should be given training in communication skills.

In analyzing problems, logical thinkers construct a causal chain to discover what the origin of that chain is. That is where they locate the blame for the problem, whether that puts the blame on themselves or on others. The site for intervention, the place where changes should be made in order to solve the problem, is the very place where blame was located. The department's low quality work was seen, ultimately, as being the result of consultants' poor skills, so those skills should be improved. The lack of feedback was seen, ultimately, as being the result of managers' poor communications skills, so those skills should be improved. In this regard, logical thinkers differ from pre-logical thinkers who more rigidly locate blame and intervention sites in others (or in themselves if they have low self-esteem), and from post-logical thinkers who, as will be seen later, take a yet more flexible view.

Logical thinkers are capable of much more abstract thought than are pre-logical thinkers, but they still draw closed boundaries in separating one part of the world they know from another. Wilma and Chris can separate "management", the function, from "managers", the people. However, it is clear to them that management is the job that managers do, that they themselves are not managers, and that Betty and Mike are managers. There is no ambiguity in that distinction. Also, they propose improving management by improving managers.

Wilma and Chris are at a definite advantage over Ed because of their abilities to think logically. They make more sophisticated causal analyses and are capable of correctly/analyzing situations in which they themselves are at fault. They can run more productive meetings because they can discuss how to structure the meeting before going on to discuss its content. They are less liable than pre-logical thinkers to be verbally manipulated by others because they can analyze arguments logically. In their problem solving they are more flexible than pre-logical

thinkers, and better able to consider others' points of view. However, they are not as flexible in their thinking as post-logical thinkers are.[4]

POST-LOGICAL THOUGHT

Mike is a post-logical thinker.[5] A characteristic of post-logical thinkers is that they see cause as happening not only linearly but also cyclically.

> After the employees' meeting, Wilma talked with Mike about management's lack of feedback to the department and how it was utlimately caused by the deparment's low profile (Figure 1a). She said she was also concerned about the staff's low morale (Figure 1b). Mike showed her that these two problems were interrelated, and that the low morale and the lack of feedback caused each other (Figure 2). She was able to follow each of the steps as Mike traced around the causal cycle with her. Still, she found it difficult to understand how her low morale caused her lack of knowledge about the value of her work when it was so clear to her that the lack of knowledge of the value of her work caused her low morale.

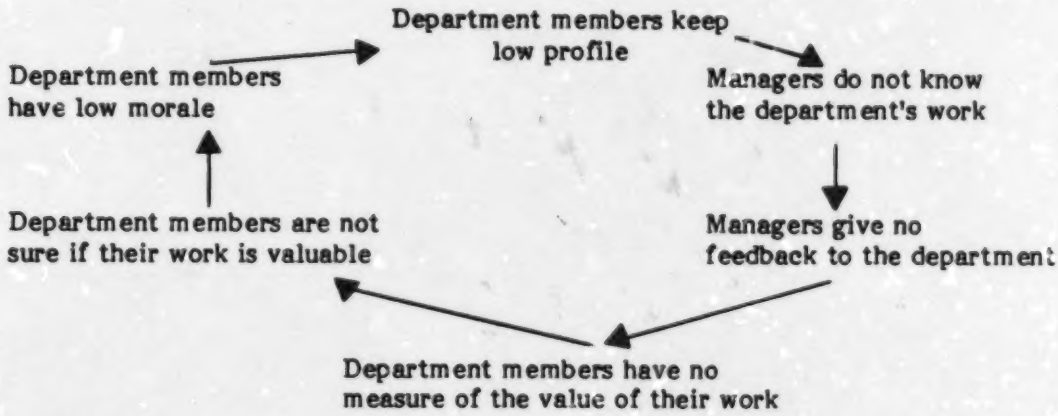
Department members keep low profile
Managers do not know the department's work
Managers give no feedback to the department
Department members have no measure of the value of their work
Department members are not sure if their work is valuable
Department members have low morale

FIGURE 2: Post-logical cyclical concept of causality

Mike also asked Wilma about a few things that were puzzling him. "Why is it that this office never advertises or promotes its services? Any private sector consulting organization would do some sort of promotion." Wilma replied that there was no need for promotion because the department was always busy and probably could not handle any more clients. Mike also wondered about some of the department's inefficiencies and asked Wilma about making changes so that the department could expand its service capabilities. "There's no need for that," she replied. "We have always been able to handle any requests for service that we get." Mike was puzzled. Somehow, the capabilities of the department happened exactly to equal the demands for service from it without the department's ever acting to control the balance by hiring or firing staff, generating new business, or shunting business it could not handle elsewhere. He understood the situation better when he compared Wilma's causal picture (Figure 3a) with his (Figure 3b). He saw that the low demand for service resulted from the lack of promotion. It seemed likely that the department was underworking itself and that when consultants had extra time on their hands they probably put extra uneeded time into existing clients rather than into generating new business. But if the department were to become more efficient, it could serve more clients, it would be able to afford to promote, and demand for service would increase.

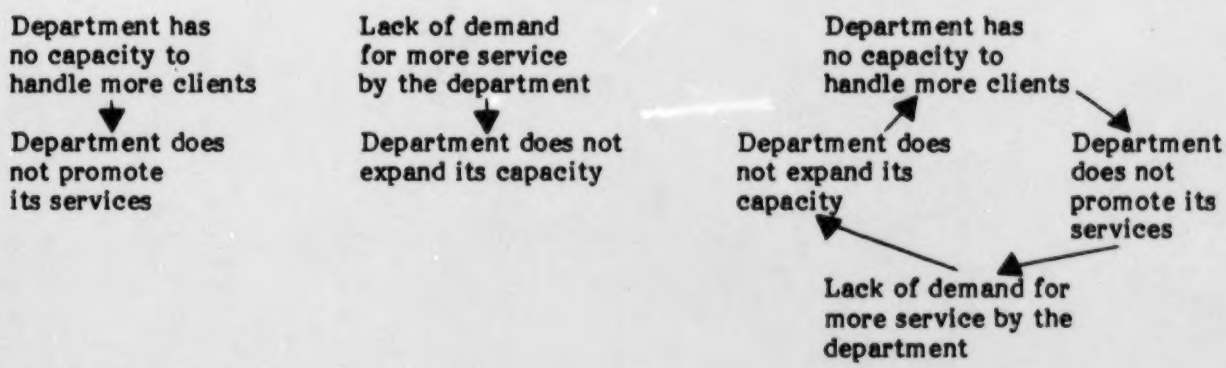
Department has no capacity to handle more clients
Department does not promote its services
Lack of demand for more service by the department
Department does not expand its capacity
Department has no capacity to handle more clients
Department does not expand its capacity
Department does not promote its services
Lack of demand for more service by the department
a
b

FIGURE 3: Linear causal chains combined into causal cycle

Logical thinkers, with their concept of causality, tend to see themselves as reacting to given aspects of their realities. In this case, Wilma saw her low morale as a reaction to managers' lack of appreciation of her work. She saw the department's not expanding its capacity as a reaction to a low level of demand for its services. Post logical thinkers with a cyclical concept of causality, understand that we often produce those "givens" in our reality to which we react. Mike could see that Wilma not only reacted to the managers' lack of appreciation of her work but also, through her low profile, caused it. He could see that the department not only reacted to low demand but also, through its lack of promotion, caused it.[6]

The cyclical view of causality enables post-logical thinkers to view things in context, and one thing they tend to view in context is logical argument. Wilma made implicit use of two syllogisms:

1. We should not promote our services if we have no capacity to serve more clients than we have now. We have no capacity to serve more clients than we have now. Therefore, we should not promote our services.

2. We should not expand our capacity if there is no excess demand for our services. There is no excess demand for our services. Therefore, we should not expand our capacity.

To Wilma, both major premises and minor premises are true, and the conclusions are valid. Mike, however, looks not only at Wilma's arguments, but also at the context in which they are made. Looking at the arguments alone (Figure 3a), he would agree with all premises and both conclusions. When he looks at them in context (Figure 3b), however, his opinion changes. He now disagrees with the first

department has no excess capacity if an increase in demand will stimulate his staff to become more efficient. He now disagrees with the minor premise of the second argument. He believes there is excess demand for the department's services, but that the department has not yet tapped it.

Note that Mike can still make logical arguments and is still convinced by others' logical arguments. The difference between him as a post-logical thinker and Wilma as a logical thinker is that Mike, unlike Wilma, looks at the context in which a logical argument is made in order to see whether the context changes the judgement of the truth of the premises.[7]

We have seen how Wilma, as a logical thinker, was able to relate the effects of one variable, e.g. staff members' skills, to the effects of another variable, e.g. staff members' morale. While logical thinkers see that there is a relation between variables, they tend to think of them as acting independently of each other. Post-logical thinkers see variables as interdependent.

> Wilma told Mike about her conversation with Ed regarding the course on consulting skills. "The other department Ed was talking about does well because its morale is high, not because of its skill level," she repeated. Mike was taken back by her definiteness and challenged for. "How can you determine which is more important, skill or morale?" he asked. "I suppose you could do something to improve skills at another time and see which brought about the greater improvement in performance," she replied. "How can you improve skill level without at the same time affecting morale?" Mike asked. "How can you improve morale without affecting skill level, say, at the very least, the skill of approaching clients cheerfully?" Wilma was confused by Mike's questions. They made sense to her to some extent, but she was sure there had to be a way to find out whether morale or skill was more important in a department's performance.

Wilma, as a logical thinker, understands morale and skill to operate independently of each other. She therefore believes it must be possible to separate the effects of morale from the effects of skill. Mike, as a post-logical thinker, understands morale and skill to operate interdependently. Each provides the context in which the other operates and neither can be varied without affecting the other.

Because post-logical thinkers look not only at objects and events but also at their contexts, and because they view causality as cyclical rather than linear, they conceptualize problems differently and intervene to solve them differently from how logical thinkers do.

> Mike thought about his staff's morale problem. Unlike Wilma, he did not blame the problem on management. Rather, he saw there was a self-sustaining cycle that needed to be stopped. He could think of several ways of improving the unsatisfactory situation, including improving top managers' communications skills and increasing his staff's visibility. He realized it would be very difficult for him to convince top managers that they needed training in communications. In fact, their very inability to listen would likely prevent them from understanding his message and acting on it. However, he could raise his staff's visibility by inviting top managers into departmental meetings and by encouraging his consultants to train other members of the organization in techniques that the department had developed.
>
> He believed that if he did this, upper managers would become familiar with the department's work and comment favourably about it to his staff members, thereby improving their morale.
>
> He also thought about the department's efficiency. He held numerous department meetings to develop and implement a plan for expanding the department's capacity, but he could see that his staff was not motivated in the process. He then switched tactics and involved his staff in some easy and enjoyable promotional activities. When his consultants saw that the promotion was working and that they soon would have more clients than they could service, they became very interested in increasing the department's capacity.

Mike, as a post-logical thinker, put the blame for problems in the dynamics of systems rather than in individuals or in events which initiate the problems. A circle has no beginning. Because he views cause as being cyclical, Mike sees no beginning to the causal process which results in the problem. He understands his staff's morale problem to be the result of an unfortunate dynamic in the system. He does not blame top management for his staff's morale problem. Post-logical thinkers do not find the concept of blame, in the sense of blaming individuals, to be useful at all in understanding how situations arise or how problems can be solved.

As a post-logical thinker, Mike is not restricted to intervening at the site of the cause of the problem for three inter-related reasons. First, as we have just seen, he does not see a problem as having a cause. Second, a causal cycle has no beginning, but it can be broken at any point. Third, post-logical thinkers understand any action as a reaction to a context; if they decide to change a particular action, they have the choice of changing the action directly or changing the context to which it is a reaction. Instead of intervening at "the cause" of a problem, post-logical thinkers intervene where they have leverage, that is, where they can effect the greatest change with the application of the least effort.

Wilma wanted to change top managers' behaviour of not giving feedback about the department's performance. As a logical thinker, she chose to consider the cause of the problem to be management's behaviour, and so she decided to intervene there. Mike, as a post-logical thinker, understood that there was no one cause of the problem, that the causal cycle underlying the problem could be broken at any point, and that managers' behaviour could be changed by altering the context to which they were reacting. His point of greatest leverage was his staff's

behaviour. By altering his staff's visibility, which he could control, he could change the managers' behavioural context. They would now have to respond to a highly visibility group instead of to a low visibility group, and they would likely respond to it by noticing it and giving it attention and feedback.

Similarly, Mike found it difficult to get his staff to increase the department's efficiency when he tried to do it directly. He had more leverage in getting the staff to promote the department's services. His staff was then working in the context of high demand for services. and it reacted to that context by increasing the department's capacity.

Post-logical thinkers are capable of more abstract thought than are logical thinkers. While logical thinkers locate cause in concrete objects and their actions, post-logical thinkers locate cause in such abstract entities as "systems dynamics". And while logical thinkers must directly intervene exactly where they want change to happen, post-logical thinkers, with their more abstract understanding of causality, can change a pattern by changing its context.

Post-logical thinkers draw open boundaries around entities and events.

> In discussions of management's responsibilities, Mike has difficulty in deciding whom he would consider to be a manager and whom he would consider not to be a manager. To him, a manager is anyone who performs management functions, such as ensuring that staff members are given feedback and setting goals for organization. When his staff members raise their visibility so as to get feedback and when they participate in goal setting sessions, they perform management functions and are managers. Beyond that, Mike understands that the boundary around the people whom the organization considers to be managers is itself open in that energy and information pass across it. Therefore, a problem in management is a problem for the whole

> organization, and the solution to the problem might come from intervention anywhere in the organization, not just in what is called "management". Mike was concerned about two of management's problems: not knowing enough about the department's performance and not giving the department feedback. He solved them not by intervening in management but by intervening in his staff. By making his staff more visible, he solved two of management's problems.

The boundaries drawn by post-logical thinkers are open in two senses. First, they do not clearly separate inside from outside but allow leakage. Second, they allow energy and information to pass across them. As a result, problems inside a boundary can be solved by intervening outside of the boundary.

Mike, as a post logical thinker, is at an advantage over logical thinkers like Wilma and Chris. While he can make and analyze logical arguments as well as they can, he can also look at their contexts and see whether that affects his judgement of the truth of their premises. He understands the interdependence of roles and can therefore analyze events more clearly. And he is more flexible in his solution of problems, directing his interventions not only at situations he wants to change but also at their contexts and at linked events where he has leverage. However, he still lacks the freedom of unitary thinkers.[8]

UNITARY APPROACH

The unitary approach[9] knows and acts on the world as a unit. In the unitary approach, one understands that while it is possible and often useful to draw boundaries which break the world into separate entities and events, the world itself is undifferentiated.

Unitary concepts are most commonly found in modern physics and in spiritual disciplines. While very few individuals are capable of sustaining a unitary consciousness, there are more who are able to achieve momentary unitary perspectives of situations. Such a person is Wilma's Aunt Maude.

> Wilma talked about the morale problem at work with her Aunt Maude, and she tried to explain what Mike had said about causal cycles in the organization. As Wilma talked about the situation, Maude understood it as human nature and as part of a much larger causal picture. Maude related how Wilma had learned to keep a low profile in her family when she was not feeling good about herself, and to assume she was not doing well if she did not have specific evidence to the contrary. Maude added that she could see Wilma's children learning the same habits.
>
> Wilma described turning down an invitation to speak about her work to other employees in the organization because she felt nervous. Earlier she had complained about Mike's boss planning her week without including any time to give Wilma and her colleagues feedback about their work. Maude tried without success to show Wilma that these were not two events but one. In Maude's view, Wilma's declining the invitation to speak invites lack of feedback.

Maude's unitary concept of causality differs in two important ways from the logical and post-logical concepts. First, to logical thinkers, the causes and effects of a given event are confined to a line. To post-logical thinkers, they are confined to a cycle. To Maude, they have no boundary; causality is all-pervading. Wilma's low morale is caused not only by management's lack of feedback and Wilma's own low profile, but also by events in her own family, events in others' families, and so on. Her low profile has effects not only on her own morale but also on her childrens' habits as they watch and learn from their mother's behaviour.

Second, Maude understands cause and effect not to be different events but different manifestations of one underlying phenomenon. It is like the way the

existence of the north pole of a magnet implies the existence of a south pole, even if the south pole is not visible. The occurrence of the cause implies the occurence of the effect, even if it has has not yet manifested. As north and south poles are different aspects of one phenomenon, neither existing in isolation of the other, so too cause and effect are different aspects of one dynamic and not separately existing events.

It is important to note that Maude can draw a boundary line and call what is inside of it a causal event. She can focus on a line or on a cycle of causality. She can also draw a separation between cause and effect. She can talk with Mike at his level and to Wilma at her level. But she understands that the boundary is not one which she has noticed out in the world, but one which she herself constructed.

Like logical thinkers, Maude is able to reason making use of syllogisms. Like post-logical thinkers, she understands that in applying logical reasoning, one must consider the context in which one reasons. But Maude's use of logic is tempered by more considerations.

> Maude could see that Wilma was not at all convinced by Mike's statement that low morale was caused by low profile. Wilma understood each step in Mike's argument, but she could not grasp his conclusion. Maude knew that she could not convince her niece of Mike's argument. So she steered the conversation to how uncertain Mike must feel of his welcome in his new position. "Wilma," she said, "where are your manners? You really ought to have an office party to welcome Mike." She convinced Wilma to hold the party and to invite Mike's boss as well. Maude knew that in the course of the party, Wilma would talk with Mike and with his boss. She believed that out of that, some rapport might develop which would lead to Wilma's getting the feedback she needed. That would at least solve Wilma's problem. If she learned from it how her morale was connected with her profile, so much the better.

Maude did not restrict herself to using logic to convince Wilma. If Wilma could learn her lesson indirectly, that would suffice. And Maude did not confine herself to changing Wilma's belief in order to change her behavior and solve her problem. If she could raise Wilma's profile subtly, without convincing her of the need to raise her profile, that also would suffice.

As a reserve strategy, Maude might have taken what would appear to be an illogical approach. She might have devised an argument to convince Wilma to keep her profile even lower, if in so doing Wilma would realize how she prevents management from getting the information it needs.

Maude can think logically, but she uses logic as only one of a number of a communication tools to change others' ideas and behaviors.

In her unitary moments, Maude differs from both logical and post-logical thinkers in her understanding of how variables relate to each other.

> Wilma told Maude about her discussion with Mike regarding skills and morale. Mike had talked about the skill of being cheerful with clients. Wilma said, "Being cheerful isn't a skill. When you are feeling good about yourself, when your morale is up, then you are cheerful. It's not a question of skill". Maude smiled, knowing that her point would be difficult to describe. "You seem to think that morale and skill are distinct, separate things. Really, they're part of the same thing, and how you define them is what makes them different. As expected, the point was lost on Wilma."[10]

While Maude, as a logical thinker, understands variables to operate independently of each other and Mike, as a post-logical thinker, understands them to operate interdependently, Maude understands that the very boundary between variables to be constructed. When she needs to in conversation, Maude can talk of 'morale' as separate from 'skills', but she understands that to be an artificial construction of two separate variables from what is essentially undifferentiated.

> Wilma took her aunt's advice and had the party for Mike. In the following weeks, she found herself making more opportunities to talk with Mike's boss. "You may find yourself becoming more assertive in other situations now as well," said Maude. "Your 'problem' provided you with an opportunity to develop yourself and overcome some barriers that had been holding you back". "That could be", replied Wilma, "but how did you figure out that my having a party would solve the problem". "I just found myself making a suggestion to you. But what makes you think your 'problem' is solved? Do you think that it consisted only of your low morale"?

To the unitary mind, problems are not problematic. Both Wilma and Mike saw in the low morale a problem to be solved, a situation which needed correction. To Maude, however, a "problem" is an opportunity to develop one's potential rather than a situation that is somehow mistaken or in need of correction. A problem occurs when the approach of an individual or an organization meets the limits of its applicability, and this provides the opportunity to improve the approach.

Also, to the unitary mind, a problem is not bounded. To a logical thinker like Wilma, the problem began with the lack of measure for the value of the department's work, and ended with low morale. To a post-logical thinker like Mike, there is a problematic dynamic in the system bounded by a casual cycle. Maude, however, understands the lack of feedback and the low morale in the department to be essentially inseparable from dynamics in other systems.

For purposes of conversation she can separate "the problem event" from its context, but she understands that separation as an action committed by her.

Finally, to the unitary mind, there is usually no problem solver sitting outside of a problem situation. Therefore, there can be no intervention. Maude understood herself to be a part of her niece's situation. She therefore did not necessarily understand herself to be deliberately "solving" a problem or "intervening" in a situation, but rather, simply to be hanging out.

It should be clear by now that the unitary mind operates at a high level of abstraction. The world is understood to be essentially continuous and without boundaries. An individual constructs boundaries, breaking the world into entities and events in order to talk about them and manipulate them. In its most developed phase, the unitary mind is concerned with a non-material reality.

In the unitary level, one develops a depth of understanding that allows one to both accept situations as they are given, and to bring about the most appropriate changes with the least disturbance.[11]

TABLE 1

STAGES IN ADULT COGNITIVE DEVELOPMENT

	PRE-LOGICAL	LOGICAL	POST-LOGICAL	UNITARY
Cause	One-step	Linear	Cyclical	All-pervading/ Cause and effect as manifestations of one dynamic
Logic	Emotion over logic/Process not separate from content	Logical	Logic in context	One communications tool out of many
Relation among variables	Unrelated	Independent	Interdependent	Constructed
Blame/problem location	Others	Where problem starts	In the system	Problems as opportunities/ Boundary constructed
Intervention site	Others	Where the problem is	Where there is leverage	Where appropriate
Ability to deal with the abstract	Concrete	Abstract	Relationships	Spiritual/Non-material
Boundaries	Closed	Closed	Open	Constructed

A CRITICAL LOOK AT CRITICAL THINKING

As I indicated in the introduction, a developmental theory such as the one presented here provides some perspective on critical thinking and on programs designed to teach it.

Most obviously, a theory that posits post-logical thinking suggests that there is a need to teach not only logical thinking but also post-logical thinking. There are adults both in college and in the workplace who do not think logically, and they need to learn how to do so. But there is a need for other adults, particularly those in management positions, to learn to think post-logically. It is the responsibility of their mentors to teach them to pay attention to causal cycles and to interdependencies among roles, and to learn to intervene where they have leverage rather than just where problems surface.

One must be able to think logically before being able to think post-logically, and on these grounds, I am in agreement with the movement to teach critical thinking. But the theory, presented here and in particular the General System Theory aspects of it, indicates some cautions that must be observed in teaching critical thinking.

General System Theory cautions us to look at phenomena in the contexts in which they occur. We should look not just at the absence of logical thinking skills and at programs to teach logical thinking, but also at the context which creates the absence of critical thinking skills. What factors in our educational system and our society at large prevents the natural development of thinking skills? Piaget's developmental theory indicates that logical thinking is something that should naturally develop in individuals. If it does not, we should look at what we are

doing to hold it back. Because adults do not think logically, there is now a need for programs to teach them to do so. But there should not be a need for such programs, and we should put some effort into finding what factors in our educational system inhibit the development of logical thinking and work to eliminate them.

Also, there is a tendency in logical thinking while solving problems to look for factors which are missing or insufficient, and to solve the problem by increasing these factors. Often, this leads to the creation of another problem when these factors are introduced to excess. General System Theory, on the contrary, seeks to bring factors into balance. Three balances in particular must be maintained in the training of critcal thinking.

First, while it is important to make a sufficient search for evidence, possibilities, and goals, while it is important that thought not be impulsive, it is also important that the thinker know when to stop thinking and when to take action. (This is why Jonathon Baron (1984) calls for an "optimal" amount of search rather than a "sufficient" or "maximal" amount of search). While impulsive thinking is a problem both in school and in the workplace, there is a problem in both settings of individuals' thinking too long and not taking action. Indeed, one of the findings of Daniel Isenberg's (1984) study of C.E.O.'s is that top managers tend to make decisions before they have had the opportunity to amass all possible evidence and come to definite conclusions.

Second, while it is important to be unbiased in use of evidence, it is also important to have some trust in one's preconceptions or hunches and to be particularly careful in examining evidence contrary to them. Another of Isenberg's findings was that C.E.O.'s are not completely rational in their decision making, but tend to

use a number of intuitive processes. While many adults have problems in fair use of evidence, many also have lost touch with their own intuition. We must find ways of teaching people correct use of evidence without losing access to intuition.

Third, while adults need to learn to think abstractly, this should not be at the cost of their ability to think concretely and emotionally. Richard Wertime (1984) laments students' inability to move beyond the emotional level of analysis represented by the following. "Personally, I don't like it when people test or challenge you. I just think it's rude". He would like them to be able to compare the concept of testing with the concept of challenging. My concern is only that the latter analysis not be taught at the cost of the ability to produce the former. While many adults cannot think abstractly, many also cannot identify and own their own feelings. It may take many adults years of Gestalt therapy to arrive at the ability to move from "Confrontation is rude" to "I get embarrassed when confronted".

THE IMPORTANCE OF COGNITIVE DEVELOPMENT

Pre-logical thinkers are liable to be manipulated by others who use arguments that would not stand up to logical analysis. They are liable to make illogical choices and to detract from the effectiveness of groups they are members of. In matters of verbal argument and analysis they are not able to serve themselves or others skillfully.

Post-logical thinkers have a flexibility in their thinking that enables them to intervene in situations in a most powerful way. They tend not to get stuck in situations that trap less sophisticated thinkers. However, there is an incompleteness in their approach that is resolved only in unitary thought.

In the past 20 years, the human potential movement has worked to raise awareness of our emotions and of our bodies. It is only recently that we have come to give due attention to mental development. The danger lies in our taking a dispassionate view of our subject. There is no more important task, nothing that will more help fulfill the potential of human beings than to improve the thinking skills of ourselves, our students, and of the population in general.

NOTES

1. The theoretical foundations of my theory are Piagetian. In his terms, I am dealing with two stages he described as "concrete operations" and "formal operations" (Piaget 1973), and two post-formal stages which he did not describe, which I have labelled "general system theory" and "unitary" (Koplowitz 1984). In order to avoid technical jargon in the discussion of my theory, I am here writing about these four stages as "pre-logical", "logical", "post-logical", and "unitary".

   I thus use the word "logical" in two senses. In the technical sense, "logical" is used as a synonym for "formal operational", the fourth of Piaget's stages. In the more general sense, I also use the word to refer to reasoning which deals appropriately with propositional logic. (See Inhelder and Piaget 1958).

2. I am characterizing individuals as being within particular stages of cognitive development only for purposes of illustration. It would be more accurate to characterize particular concepts or strategies as being within given stages. Any given individual will tend to use concepts and strategies from several stages although he or she may function predominantly in one mode. An adult may, for example, tend to think logically, in some areas think post-logically, and occasionally slip into pre-logical thinking.

3. For a more detailed look at pre-logical thinking among adolescents and adults, see Wertime 1984, Renner and Paske 1977, and Lochhead 1978, 1977 & 1980.

4. For a more detailed view of logical thinking as a psychological phenomenon, see Inhelder and Piaget 1958, Perry 1968, and Commons et al. 1984.

5. What I am here calling "post-logical thought" follows the structure of general system theory. General system theory (G.S.T.) is usually defined as a discipline "whose subject matter is the formulation and derivation of those principles which are valid for 'systems' in general" (Von Bertalanffy 1968, p. 32). I find it unsatisfactory to consider G.S.T. a study of something external. Such a definition leads to arguments as to whether a particular entity such as an automobile engine is or is not a system, when G.S.T. itself holds that anything can be regarded as a system. It is more useful to consider G.S.T. to be a way of thinking, or as a stage in the development of thinking.

6. The post-logical view of causality differs from the logical view in another important way. The logical thinker believes that if applying a small force will result in a small effect, then applying a large force will result in a large effect, and that the effect will be in the same direction as that of the force applied. The post-logical thinker understands that a small force can also result in a large effect if a positive feedback cycle is involved, a large force can result in a small effect if a negative feedback cycle is involved, and, in paradoxical interventions, a force can result in an effect in the opposite direction. For further exploration of the post-logical concept of causation, see Koplowitz 1976, Watzlawick, Beavin, and Jackson 1967, and Watzlawick, Weakland, and Fish 1972.

7. The arms buildup represents another example of this kind of reasoning. It is reasonable for the U.S. to build up its arms in the face of expanding Soviet military strength. It is reasonable for the U.S.S.R. to build up its arms in the fact of expanding American military strength. It is only when these reasonings are viewed in context of each other that their fallaciousness becomes apparent.

8. For a more detailed view of post-logical thinking, see Koplowitz 1976, 1978 and 1984, Watzlawick, Beavin, and Jackson 1967, and Commons et al. 1984.

9. Thought is a mental process of working out how different things relate to each other and how mental images are affected by transformations. I believe that individuals who operate at a unitary level do not work out their answers but rather have a direct or obervational access to them, and that there is, therefore, no "unitary thought". There are, however, unitary concepts and unitary consciousness.

10. The concept of variable as construct appears in modern physics in the Heisenberg uncertainty principle. The physicist cannot measure both position and momentum with total accuracy. The process of measuring a variable such as momentum is more akin to creating the variable than it is to discovering or noticing it.

    The concept of variable as construct appears in spiritual traditions as well. In the Hindu tradition, the word "maya" is used to refer to the illusion that the diversity we perceive is real. The undifferenciated world is considered to be real, but the boundaries which break it into separate variables, entitites, and events are not real.

11. For a further look at the unitary stage see Koplowitz 1978 and 1984 and references in them to spiritual texts and concepts in modern physics, and Wilber 1981.

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